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RECCE-STRIKE COMPLEXES IN SOVIET THEORY AND PRACTICE

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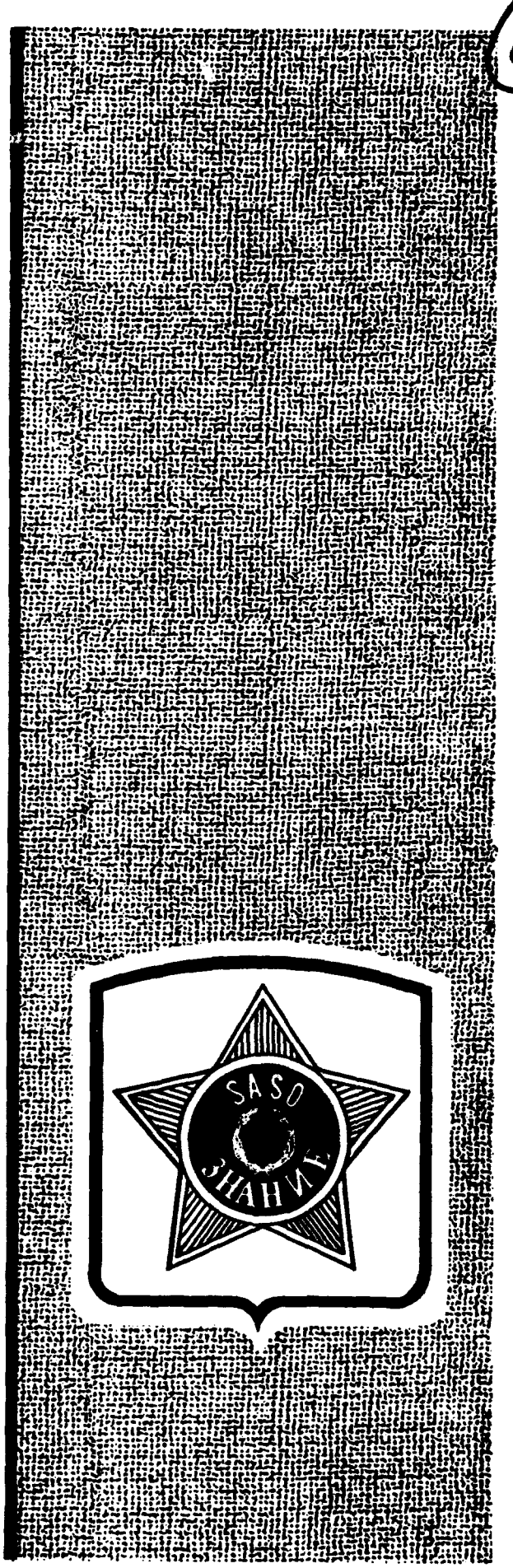

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RECCE-STRIKE COMPLEXES IN SOVIET THEORY AND PRACTICE

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June 1990

This article presents the views and opinions of the author and should not be construed to represent those of the U. S. Department of the Army or the U. S. Department of Defense.

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FOREWORD

This study of the Soviet concepts, reconnaissance-strike and reconnaissance-fire complexes, by Dr. Milan Vego provides important insights into the origins and evolution of this new element in the contemporary revolution in military affairs, which is now in the process of reshaping Soviet military art, redefining operational art, and recasting the nature of combined-arms combat. One of the most persistent features of Soviet military culture has been the tendency to use secrecy regarding weapons research and development to conceal technological progress, even while Soviet military science was in the process of assessing the impact of such new technologies and developing the concepts for its employment. Such an approach creates a clear and present asymmetry between Soviet and Western military cultures and has been used since the 1920s to seek advantage in the on-going struggle for the "technological initiative," as the Soviet military theorist, A. A. Svechin, described this process. According to Svechin the point was to study thoroughly and systematically the technological developments in other societies as they might affect military affairs, while making every effort to conceal from any potential opponent any details regarding one's own programs and initiatives. Thus, in the Soviet case the West has a record of discussions of concepts before capabilities have been acknowledged and often even before they have been fielded. It is in this context that the current study has great value. By analyzing the discussions of these concepts in Soviet military literature and relating them to other aspects of Soviet military art Dr. Vego provides us with a forward-looking assessment of the impact of such systems on Soviet military art in a period of rapid and profound change.

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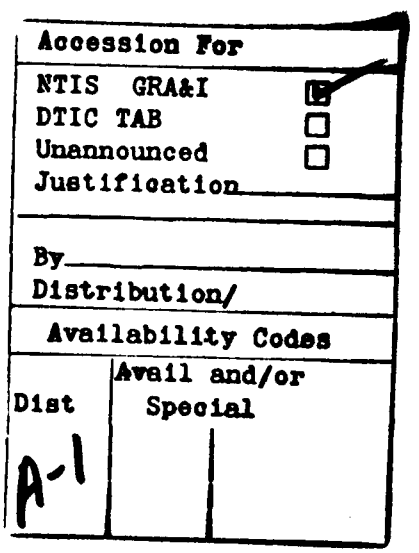


PREFACE

In the last few years, the Soviets have become increasingly preoccupied with the problem of how to neutralize or destroy NATO nuclear delivery systems before they can be used against advancing Soviet/Warsaw Pact forces. However, the Soviet offensive can be successful if not only NATO's nuclear systems, but also ground-based command, control, communications, and intelligence (C3I) systems and various air and air defense assets are neutralized. The steady improvements in mobility, range, and destructive power of various weapon platforms used by NATO was bound to complicate, and complicate greatly, the Soviet problem of how to neutralize or destroy them at the very outset of hostilities, and in the course of combat on the ground. This problem could be resolved only by completely integrating and automating all available reconnaissance assets, command, control and communications (C3) systems, and means of destruction into what the Soviets call a recce-strike complex.

The Soviet Navy was the first service to develop over a period of time what amounts to recce-strike complexes. The navy's combined arms concept envisages the joint operational or tactical employment of cruise-missile submarines, torpedo attack submarines, air-to-surface missile (ASM)-armed bombers, and surface-to-surface missile (SSM)-armed surface combatants to engage powerful U.S. carrier battle groups (CBG), surface action groups (SAG), and other Western naval formations on the open ocean.

Likewise, since the early 1980s, the Soviet ground forces came increasingly to face similar problems as the navy did, and similar solutions have been found. New advances in technology, notably increased range and destructiveness of tanks, artillery, and tactical missiles, required improvements in the C3 system of Soviet ground forces. And to effectively hit fast-moving and frequently concealed targets on the battlefield, the Soviet commander required the highest degree of integration of reconnaissance and strike assets. It was possible to achieve this primarily by the introduction of highly automated C3 systems at all command echelons.

In the recent years, the Soviets began to pay increased attention on the pages of their professional journals to various new and integrated U.S. weapons systems, specifically U.S. PLSS (Precision Location Strike System), JTCAMS (Joint Tactical Missile System), Assault Breaker, and JSTARS (Joint Surveillance Target Attack System). The Soviets consider each of these systems to be a prime example of a recce-strike complex [razvedivatel'no-udarnyy kompleks]. To be sure, they never directly refer to their own and similar systems; however, there is little doubt that the Soviets have developed their own recce-

strike complexes. These are probably not as advanced as those developed for the U.S. forces, owing to well-known Soviet shortcomings in regard to automated C3 systems. However, the Soviets are improving their capabilities in these and other aspects of ground combat.

The principal objective of this paper is to explore both theoretical and practical aspects of possible Soviet recce-strike complexes. Note that despite the use of the term "complex" by the Soviets, a recce-strike complex is not a permanent system, but a collection of various subsystems assembled and directed to accomplish a specific task. Subsystems of a particular recce-strike complex can belong at the same time to another recce-strike complex. Thus, the best way to describe the Soviet concept of recce-strike is to describe and analyze various subsystems or elements which comprise a recce-strike complex. Therefore, the essentials of recce-strike complexes, i.e., reconnaissance, fire concept, and lastly, but perhaps most important, the C3 subsystems, will be described and analyzed in some detail.

This paper has been written exclusively by using unclassified Soviet/Warsaw Pact and Western sources. A number of books were used, including the 2d edition of Taktika [Tactics] edited by V.G. Reznichenko and published in 1987, Takticheskaya razvedka [Tactical reconnaissance] and Razvedka v boyu [Reconnaissance in combat] by R.G. Simonyan. Most of the 8 volumes of the Sovetskaya voyennaya entsiklopediya [Soviet military encyclopedia] published between 1976 and 1980 were consulted in writing this paper, as were both editions of the Voyennyy entsiklopedicheskiy slovar' [Military encyclopedic dictionary] published in 1983 and 1986. These sources are indispensible for understanding the true meaning of various Soviet military terms. Most of the Soviet writings on Western recce-strike complexes have been published in the journal Zarubezhnoye voyennoye obozreniye [Foreign military review]. These articles are a valuable source because they frequently provide Soviet thinking on a particular subject. Other Soviet professional journals used were Voyenyy vestnik [Military herald] and Tekhnika i vooruzheniye [Equipment and armaments]. The East German military journal Militaerwesen [Military art], obtained from the Bibliothek fuer Zeitgeschichte in Stuttgart, West Germany, proved to be an invaluable source for deducing some Soviet thoughts with respect to various elements of recce-strike complexes. Finally, the West German Soldat und Technik [Soldier and technology] provided much information on Soviet recce-strike complexes and their individual components.

Contents

Page

Preface ii
List of Figures v
Ch 1: RECCE-STRIKE CONCEPT 1
Ch 2: RECONNAISSANCE 8
Ch 3: FIRE.....16
Ch 4: COMMAND AND CONTROL 27
Ch 5: CONCLUSIONS.....36
Notes.....39
Selected Bibliography.....48

List of Figures

Functional Scheme of a Recce-Strike Complex 4
Fire Support 18

Chapter 1

RECCE-STRIKE CONCEPT

The development of recce-strike complexes came as a result of several factors, some doctrinal and other technological. First, the increased emphasis by the Soviets since the late 1970s on the use of conventional weapons in any coalition war in Europe provided a framework for the development of new and highly advanced systems capable of performing tasks previously assigned to tactical and operational-tactical nuclear delivery systems.

The Soviets assert that qualitatively new possibilities for conducting reconnaissance, command and control, and target engagement have emerged in recent years. Hence, diverse tasks on the battlefield can be performed by Soviet Ground Forces in close cooperation with frontal and army aviation in much shorter time and at greater depth than was possible before. There were several reasons for this development. First, conventional fire power of all services and combat arms of the Soviet Armed Forces increased considerably. The Soviets apparently agree that the most advanced conventional weapons had destructive power similar to tactical nuclear weapons. Consequently, not only with nuclear weapons but also with conventional weapons is it possible to weaken the adversary so that he cannot operate successfully. Hence, the uninterrupted reconnaissance and engagement of all enemy firing means before they are used is one of the most important prerequisites for the successful outcome of one's own actions. Second, the development of mini computers with the capabilities equal to what until recently only large computer systems had makes it possible not only to use autonomous reconnaissance, command and control, and strike systems, but also to automate them, and above all to integrate all these systems into a fully automated system. These systems resolve the tasks of reconnaissance and target engagement faster, more accurately, and more reliably than earlier systems. Recce-strike systems are capable of collecting more comprehensive and timely information on the situation. Errors and interference in each individual part of the system do not significantly influence the overall performance of the system, because these are neutralized as a result of the harmonious operation of other components of the same system.[1]

The Soviets describe the recce-strike complex (razvedyvatel'no-udarnyy kompleks/RUK) as the unified automated system which provides support and combat employment of high precision, long-range weapons. Generally, it consists of reconnaissance, target designation, vectoring, navigation, and communications assets.[2] Specifically, a recce-strike complex encompasses four basic components: an automated system of reconnaissance and vectoring or automated system of fire, a mobile ground-based center of control or center of fire control, a high precision means of destruction, and a system for precise determination of the location of a recce-strike complex.[3] The

Soviets make a distinction between recce-fire complexes (razvedyvatel'no-ognevoy kompleks/ROK) and recce-strike complexes. The first refers to the strikes of tube and multiple rocket launchers [MRL] or rocket artillery, while the latter pertains to the strikes conducted by tactical aviation, and ground-based operational-tactical and tactical missiles. The recce-strike complex consists of elements for collection, storage, and evaluation of information on the situation, weapon platforms, weapons control, special ammunition, and elements for receipt, display, and transmission of data.[4]

A Western source recently defined the Soviet recce-strike complex as a combination of new artillery systems, including new remotely piloted vehicles (RPV), advanced counterbattery radars, new munitions, including both advanced unguided and guided ammunition, new command and control systems to coordinate target acquisition, designation, and engagement, and new weapons subsystems.[5]

Recce-strike complexes must ensure instant readiness for action and provide for reconnoitering and striking moving or fixed targets on the ground or at sea at ranges from 200 to 300 kilometers.[6] They also must be able to deal with a large number of targets and radical changes in the situation, and possess a high degree of reliability and survivability under conditions of enemy counteraction by fire and electronic means.

The Soviets assert that the recce-strike complex allows real time reconnaissance and destruction of a target. In the past, the reconnaissance of a target was conducted twice: prior to the planning of a combat action, and just before the delivery of the strike. However, the time interval between detection of the target and engagement was too great. It allowed highly mobile units such as armor units to change their position and thus avoid or reduce the effectiveness of the strike against them. The recce-strike complex allows for detection and a simultaneous strike against such targets, i.e., it excludes the need for final reconnaissance.

The Soviets stress that air and ground elements of the recce-strike complex are not simply the sum of interconnected means of reconnaissance, target designation, and destruction, but an integrated and highly automated system which ensures simultaneous use of reconnaissance data by means of destruction.[7]

The Soviets apparently differentiate between operational, and operational-tactical recce-strike complexes. The former extends up to a depth of about 500 kilometers from the forward line of enemy troops (FLET). The operational-tactical recce-strike complex resolves two basic tasks. First, it conducts electronic reconnaissance, including detection, identification, classification, and determination of location of enemy air

defense assets, radio communications centers and other ground targets in an area of 200,000 to 300,000 square kilometers. The second group of tasks includes control of air-to-ground and ground-to-ground weapons, including vectoring of one's own tactical aircraft by automated radio command systems.[8]

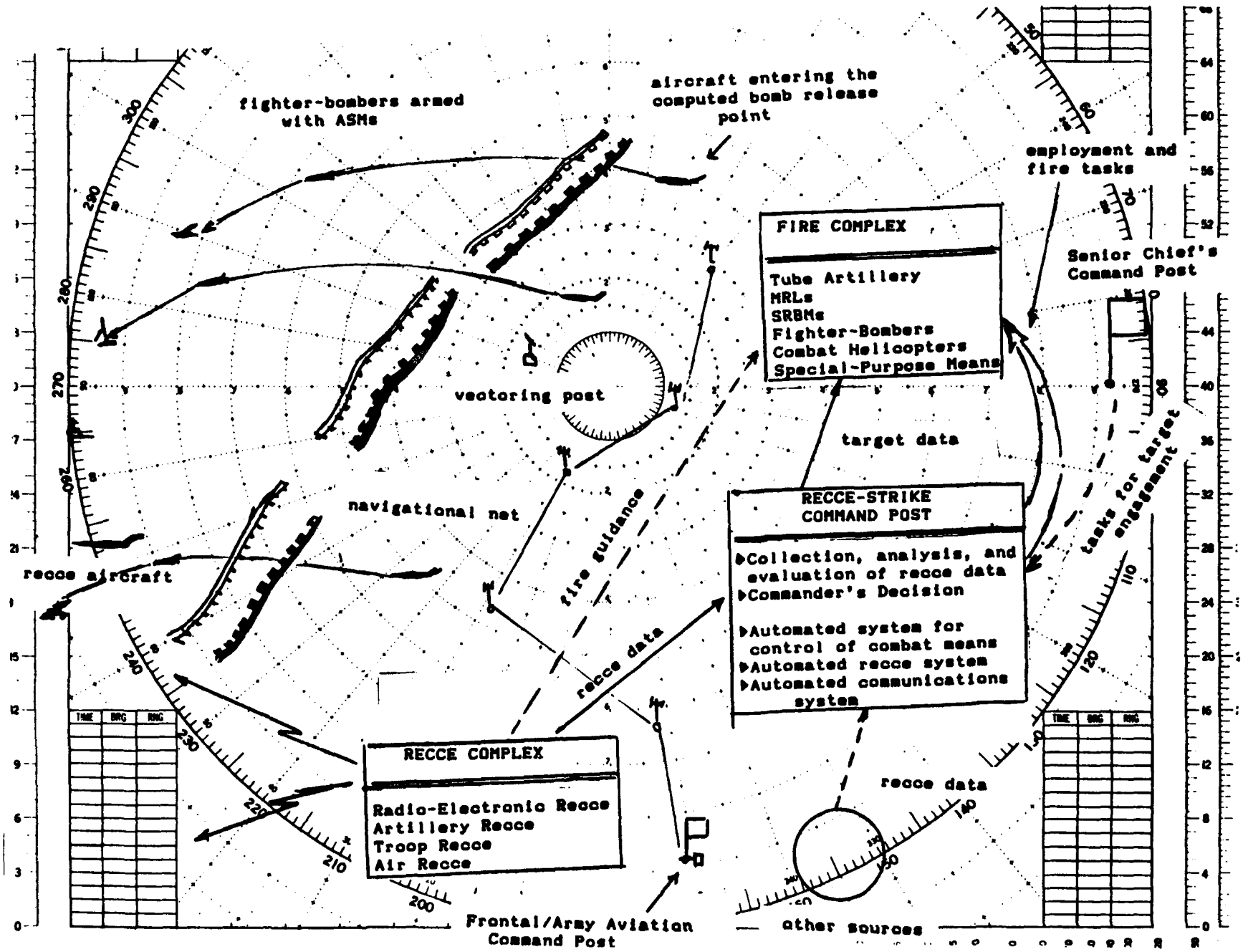
The operational-tactical recce-strike complex is used to conduct strikes against enemy armored targets, and groupings of enemy second echelon forces in the tactical depth. The objective will be to destroy these targets before their entrance into combat. The tactical recce-strike complex consists of reconnaissance aircraft and ground control relay centers for evaluating reconnaissance information and guiding weapons and other means of destruction.[9]

According to a Western source, Soviet tactical recce-strike complexes are intended to destroy targets at a depth of 50 kilometers. They consist of a system of computer-supported reconnaissance assets and tube artillery, including MRLs. Their employment is envisaged at division level. An army or front uses great diversity of target acquisition means and long-range artillery. The combinations of these systems in operational recce-strike complex, which also includes missile systems and air support assets, must ensure destruction of targets at a depth of up to 300 kilometers.[10]

The principal components of any Soviet recce-strike complex are the reconnaissance complex, fire complex, and command and control complex (see figure 1). Recce-strike or recce-fire complexes combine engagement and reconnaissance assets, as well as a system for collection, storage, processing/analysis and relaying on the basis of autonomous total systems. They are supposed to make possible immediate target acquisition, evaluation, allocation to suitable weapon systems, and calculation of initial values for firing and ensuring high hit probability. In principle, the identify-destroy cycle should not last longer than 6 to 10 minutes. Under favorable conditions, artillery fire could be even on target as soon as 2 minutes after target recognition.[11]

The command post of the recce-strike complex can be linked with different reconnaissance assets. It is usually located in the vicinity of the command post of a major field formation. Its mobility is increased when an airborne command post is used and linked with air delivery systems. Then necessary target allocation are registered, transmitted, and carried out more quickly.

Delivery systems integrated in a recce-strike complex can consist of tube artillery, MRLs, attack helicopters, and fighter-bombers. Reportedly, the basic structure exists neither for the fire complex nor for reconnaissance assets and forces working in


fighter-bombers armed with ASMs
aircraft entering the computed bomb release point
employment and fire tasks
FIRE COMPLEX
Tube Artillery
MRLs
SRBMs
Fighter-Bombers
Combat Helicopters
Special-Purpose Means
Senior Chief's Command Post
vectoring post
target data
navigational net
RECCE-STRIKE COMMAND POST
Collection, analysis, and evaluation of recce data
Commander's Decision
Automated system for control of combat means
Automated recce system
Automated communications system
fire guidance
tasks for target engagement
recce aircraft
recce data
RECCE COMPLEX
Radio-Electronic Recce
Artillery Recce
Troop Recce
Air Recce
recce data
Frontal/Army Aviation Command Post
other sources

the system. Available forces and assets are assembled in accordance with the mission and the situation. Fire complexes are also linked with forces that reconnoiter in the depth of enemy territory, specifically special-purpose troops or spetsnaz. Based on information obtained from these troops, targets can be engaged effectively through the entire depth of enemy territory.[12]

Soviet recce-strike complexes will be used in offensive or defensive combined arms combat. The Soviets differentiate between two zones extending from the FLET rearward to the extreme rear boundary of enemy's operational deployment. The zone of combat influence (zona boyevogo vozdeystviya) is the area within whose boundaries enemy facilities or targets can be detected, destroyed or suppressed by one's own forces and assets. The depth of this zone is determined by the range of the means of destruction, the time needed to destroy the enemy's first echelon forces, and the time needed to prepare for subsequent actions to rout the enemy's second echelon. The Soviets maintain that under conditions of the European "theater of military actions" (TVD) the zone of combat influence for a brigade would be up to 15 kilometers, division -- 70 kilometers, corps -- 150 kilometers, and formations larger than an army corps -- 300 kilometers.[13]

The second zone is the zone of potential threat (zona potentsial'noy ugrozy). This zone is contiguous to the zone of combat influence. In it are deployed enemy second echelon and reserve forces. The depth of the zone of potential threat for a brigade is 70 kilometers, division - 150 kilometers, corps - 300 kilometers, and formations larger than an army corps - 1,000 kilometers.[14]

Strikes in the Soviet recce-strike concept are primarily delivered by aviation, ground-based operational-tactical and tactical missiles, and artillery. The Soviets describe the strike (udar) as a form of combat employment for missile troops, ground forces, air forces and the navy in operations and tactical combat. The strike is accomplished by the brief, powerful destruction of the enemy with nuclear or conventional weapons or the advance of one's own troops. The Soviets regarded the strike as primarily tactical in its character, and related to a specific weapon. Relatively recently the term acquired broader meaning and included operational-strategic elements. The Soviets currently consider the strike to be the dominant form of troop combat action, using advanced weapons at the greatest ranges to achieve the most decisive results.[15]

According to its size and the objectives to be achieved, the strike can be strategic, operational, or tactical. The Soviets distinguish among troop, air, and naval strikes. Depending on the type of weapons used, nuclear or missile-nuclear, and "fire"

or conventional weapons fire strikes are differentiated. Conventional weapons fire can be conducted by aviation, missiles with conventional munitions, tube artillery, MRLs, and mortars.[16]

The air strike is a short, powerful employment of aviation force against ground or sea targets with the aim of destroying or defeating them. According to the size of force used to strike the target, the Soviets differentiate between single, group, and massed air strikes. The single air strike is conducted by a single aircraft and, as a rule, against a single target. The group air strike is carried out by units, subunits or aircraft groups against one or several ground or sea targets in a limited area. The massed air strike is conducted by one or several aviation formations in a single operational disposition and in a short period of time (usually several hours), against the most important enemy ground or sea targets in the operational or strategic sector, and in a wide area. [17]

According to the type of conventional weapons employed, the air strike can be a missile, bombing, bombing-missile, or torpedo-bombing strike. The missile air strike is inflicted against ground or sea targets with the use of air-to-ground missiles (AGM). The bombing-missile strike uses aviation with the bombs and missiles against ground or sea targets. It can be carried out against one or several closely arrayed targets. The strike is delivered by groups or single aircraft of several types of aviation. Missiles are normally used first and then bombs.[18] The bombing strike is carried out against one or several closely arrayed ground or sea targets.[19]

Another form of strike is the air raid [vozdushnyy nalet], which can be either a bombing or bombing-missile strike conducted by a single aircraft, group of aircraft, or several groups, units, or forces of aviation.[20]

According to the time sequence the air strike can be concentrated or simultaneous, and non-concentrated or successive.[21] The simultaneous air strike is carried out at a specified time simultaneously by a force of aircraft against one or several ground or sea targets deployed in a specific and limited area. It is used for the immediate destruction of a target in a short period of time.[22]

The successive air strike (also called echeloned air strike) is delivered by part of an aviation unit or a force against a single or several ground or sea targets. These can be assigned in advance or in the course of a combat action. This type of air strike also can be conducted on call from an alert on the ground or in the air in the established sequence.[23] In striking targets on the ground, Soviet air subunits or units can approach an objective on one or several routes, and then strike from one or several directions and altitudes from one or several run-ins.[24]

The Soviets hold that the fire of nuclear weapons in ground combat will not be sufficient to accomplish the assigned objectives. Therefore, the fire of conventional weapons must be used too. Because the destructiveness of conventional weapons has dramatically increased in recent years, conventional fire is used to prepare for and support troop strikes. It affords swift exploitation and creates conditions necessary for carrying out maneuvers.[25] By 1981 the Soviets apparently adopted the term fire strike [ognevoy udar], which had been previously used only when referring to nuclear fires.[26] This is described as a short blow against an enemy grouping by missiles with conventional warheads with the aim of destroying the target with a given degree of damage and in a given (short) time.[27]

Soviet tube and rocket artillery is used to deliver a fire raid [ognevoy nalet]. This is characterized by the surprise opening of fire and large density of fire. The Soviets distinguish between continuous and interrupted fire raids and raids conducted by either rapid fire or battery fire methods.[28]

Chapter 2

RECONNAISSANCE

In conducting offensive or defensive combat, the Soviets rely heavily on the speed and accuracy of their reconnaissance and target acquisition. Reconnaissance assets comprise one of the principal components of the Soviet recce-fire and recce-strike complexes. The Soviets postulate that combined arms combat requires a direct link between detection and suppression or neutralization of the most important targets, including vectoring against enemy means of destruction. To achieve the full effectiveness of its own weapons and maneuverability of troops, it is necessary that evaluation and transmission of obtained information take place in real time or near real time.

Reconnaissance [razvedka] is one of the components of operational or combat support of troops and aviation. It is organized by commanders, and staffs at all levels, and in any situation.[29] With respect to the target's value and significance, the Soviets differentiate between strategic, operational, and tactical reconnaissance. Operational and tactical reconnaissance are the principal parts of recce-strike complexes.

Operational reconnaissance is organized by commands and staffs of major formations. It is directed to support the preparation and conduct of operations by forces and formations of various services of the armed forces, independently or jointly. Tactical reconnaissance is an important part of the security and combat actions of troops and forces at the tactical level. It is organized by commands and staffs of all troops and forces, special troops, and combat services. The main objective of tactical reconnaissance is to obtain data necessary for the preparation and successful conduct of battle. Depending upon the sphere of action, nature of the tasks, and available forces, the types of reconnaissance are ground, sea, space, air, and special reconnaissance.[30]

The most important type of reconnaissance in the effective employment of recce-strike complexes is air and ground reconnaissance. The Soviets also are relying increasingly on their space reconnaissance assets in the operational and tactical employment of their forces and troops.

The Soviets think that with an increase in the maneuverability of troops and tempo of combat actions and the massive employment of diverse types of weapons the possibility of achieving surprise has been considerably increased. Hence, air reconnaissance has become the principal source of information on the adversary's troops and forces in the conduct of an operation or battle. The Soviets assert that up to 80% of data in

preparating and executing combat actions are obtained by using air reconnaissance. They postulate that because of the large quantity of data obtained with air reconnaissance and, at the same time, limited forces and assets available, strict centralization of the planning and combat employment of air reconnaissance forces is required. [31]

The increased importance of air reconnaissance in the conduct of combat operations is primarily owing to the increase in firepower, mobility and precision of all weapons systems. High precision conventional weapons, in fact, approach the effectiveness of tactical nuclear weapons. [32]

Air reconnaissance is most suitable to reconnoiter large areas in the shortest possible time, and to concentrate rapidly activities in other important areas and in those areas in which other reconnaissance forces and means cannot be used. Air reconnaissance can obtain reliable and precise data on coordinates of the targets and transmit them in a timely manner. It can be used uninterruptedly in all combat situations.[33]

The increased number of important targets on the battlefield and in the rear of the enemy's defenses confronts air reconnaissance with the task of detecting and classifying targets which represent the most immediate threat to one's own forces. Also, deep deployment of the combat formation of enemy troops, and the availability of powerful second echelons and reserves has led to an increase in the area to be reconnoitered from the air.[34]

Air reconnaissance is understood as the acquisition of information on enemy troops and forces, and the terrain or water area. It is performed by aircraft of reconnaissance units or subunits, as well as by the crews of other combat arms of aviation. The main methods of aerial reconnaissance are visual observation, aerial photography, and the use of radio technical assets.[35]

The Soviets claim that the modern concept of recce-strike has further increased the importance of air reconnaissance. To destroy targets in great depth by using missiles and artillery, it is necessary to obtain complete and precise data on characteristics and coordinates of the targets of the impending strike. In addition to this, the deployment of recce-fire and recce-strike complexes and AWACS-type aircraft require the transmission of targeting data in real or near real time.[36]

The Soviets apparently believe that the new generation of advanced air reconnaissance sensors ensure immediate detection and continuous surveillance of the entire battlefield, including periods of limited visibility. The swift search and precise target designation for one's own strike complexes precludes the

possibility of surprise use of corresponding forces by the adversary.

Air reconnaissance supports the uninterrupted control of Soviet strike complexes. This type of reconnaissance can obtain quickly the results of strikes by one's own troops and forces, select targets for subsequent actions, and carry out final reconnaissance of the targets of the strike.[37]

Air reconnaissance must ensure rapid acquisition of prospective targets and precise determination of their position and basic characteristics. It also must provide target designation to one's own strike complexes. At the same time on-board reconnaissance sensors and tactical procedures must allow the aircraft's crews to carry out continuous surveillance and timely transmission of data to the higher command.[38]

The task of air reconnaissance, in general, is to detect enemy troops in staging areas and during movement, the location of nuclear delivery systems, artillery firing positions, and engineering structures on the ground, and the location of command posts, electronic sensors, and rear area installations.[39]

Modern aircraft are fitted with highly effective photo, radio, electronic, infrared (IR), radar and other sensors. The Soviets claim that air reconnaissance is capable of obtaining data on various enemy installations practically without regard to the time of day or weather.[40]

Aircraft can reconnoiter large areas in a very short period of time, using diverse reconnaissance methods. For example, by flying at a certain altitude and using radio-technical means, an aircraft can reconnoiter an area 600-800 kilometers wide and 350-400 kilometers deep. By using cameras, modern reconnaissance aircraft can reconnoiter an area as large as 250,000 square kilometers. By visual observation, accuracies of 30-100 meters can be attained, while photo reconnaissance provides accuracy identical to a large-scale topographic map. However, in the European theater aerial reconnaissance from an altitude from 25,000-30,000 meters is possible only 15-20 days per year. Hence, the majority of reconnaissance aircraft will be used for low-altitude reconnaissance.[41]

Radio-technical aerial reconnaissance provides accuracy of 30-300 meters. In principle, all data can be transmitted immediately by the aircraft. Currently the uninteruptedness of air reconnaissance has the greatest importance, because the mobility of troop and high intensity of combat actions rapidly makes data rapidly, hence unusable.[42]

Air reconnaissance is also conducted by helicopters which are fitted with a variety of reconnaissance sensors. Using

binoculars, the helicopter's crew can detect targets at a range of 10-12 kilometers. By using cameras, a reconnaissance helicopter flying at an altitude of 2,000 meters and at a distance from the front of 1-3 kilometers can reconnoiter a 10-km swath beyond the FLET.[43]

The principal task of reconnaissance helicopters is to detect the opposing forces, their composition, and their combat formation. They also reconnoiter enemy firing assets, and nuclear weapons in particular. Helicopters can detect bridges and similar structures behind enemy lines, elements of C3 systems, and other targets in the tactical depth of the enemy defenses. They are also used for search and surveillance of enemy tank columns and mechanized units on the move. Soviet reconnaissance helicopters will be used for reconnoitering the landing zones of enemy airborne troops, assembly areas of subunits transported by air, routes of their maneuver, terrain, conditions for concealed flight of transport helicopters over enemy territory, and the enemy's defense system.

The Soviets believe that helicopters are especially useful for surveillance of flanks and gaps in the combat formation of their own troops. Finally, helicopters can be employed for vectoring other attack helicopters and fixed-wing aircraft on the detected targets.[44]

The Soviets apparently regard visual observation from an aircraft as the basic method of reconnoitering the actions of enemy tactical-size forces and units, artillery firing positions, and the actions of moving targets on the ground. The information obtained by visual means is transmitted via radio to the respective command posts on the ground. The success of visual reconnaissance from an aircraft depends on flight altitude, speed, visibility, size of reconnoitered objects and degree of their concealment, degree of surprise achieved, and finally, the observation skills of the air crews.

Reportedly, a boxcar can be seen visually from an altitude of about 3,000 meters, a tank or truck from 2,000 meters, and a human from an altitude of 500 meters. To achieve surprise, visual reconnaissance from aircraft is conducted from very low altitudes with periodic "popping-up" to higher altitudes. The air crew can be tasked to reconnoiter a 150 x 300-km area, one to two directions, or one to three objects during a single sortie. Visual reconnaissance is normally conducted with one fixed-wing aircraft or two to four helicopters. If the area to be reconnoitered has strong antiair defenses, then usually two aircraft will be used simultaneously to conduct visual reconnaissance. [45]

The Soviets maintain that radio-technical means fitted on an aircraft not only allow for detection of targets on one's own

territory and in the depth of the enemy deployment, but also make it possible to conduct strikes with high-precision weapons systems. In other words, they make it possible to effectively employ various recce-strike complexes.[46] Radio-technical reconnaissance conducted by aircraft is independent of weather, time of day or night, and time of year. The reconnaissance depth is up to 100 times larger than the aircraft's flying altitude.[47] All Soviet reconnaissance aircraft are fitted with a variety of cameras. The film can be developed up to 3 hours after landing. For lateral penetration of the enemy's defense area, side-looking airborne radar (SLAR) is used. The reconnaissance fighter Foxbat and Il-18 Coot-A are equipped with radar capable of reconnoitering an area up to 150 kilometers behind the FLET. Soviet reconnaissance aircraft, specifically Foxbats and Fitters, are also equipped with TV/Side Scan Data Link with almost no time delay. By using multiple sensors they can penetrate darkness and foliage. These aircraft can reconnoiter the location of enemy combat vehicles.[48]

Resolution from using IR sensors from a flight altitude of 1,500 meters is 1-2 meters. The aircraft then can scan an area 2-3 times larger than its altitude. The advantage of this method is that it can be used at night with some overcast and light fog. All objects which have a temperature different than the surrounding terrain can be detected.[49]

Soviet reconnaissance aircraft normally operate in pairs at low altitude. They are usually armed and escorted by fighter-bombers to attack any target of opportunity, especially nuclear weapons or their delivery vehicles.[50]

Ground reconnaissance consists of troop, radio electronic, artillery, engineer, radiation and chemical reconnaissance.[51] Recce-fire and recce-strike complexes use almost exclusively information obtained by artillery and radio-electronic reconnaissance. In some cases, data obtained by other types of ground reconnaissance are used as well.

The Soviets maintain that the role of ground reconnaissance of troops has been considerably enhanced in recent years by the greatly increased range and speed of modern weapons. The basic efforts of ground troop reconnaissance are directed toward obtaining timely data on the disposition of targets in the enemy depth. Its primary targets are enemy missile launchers, command posts, nuclear weapons storage areas, and communications centers.[52]

Artillery reconnaissance is aimed at obtaining information on enemy targets required for preparation and fire of one's own artillery and tactical surface-to-surface missiles.[53] Its main task is to determine the location of enemy tactical missiles, artillery and mortar batteries, tanks, antitank guns, anti-tank

guided missiles [ATGMs], self-propelled AA guns, fixed-wing aircraft, helicopters, observation posts, command posts, and radio-technical assets. It also has the task of determining the size of strong points in the enemy defense, the character of defense installations and obstacles, the area of enemy reserves, their routes of movement and their deployment sectors. Artillery reconnaissance also monitors the results of fire by its artillery. When nuclear weapons are used, the main task of artillery reconnaissance is to reconnoiter enemy nuclear delivery systems.[54]

Artillery reconnaissance is conducted with the help of optical gear, sound-ranging posts, radio posts, and spotting helicopters. Specially organized artillery reconnaissance groups (ARG) are tasked for reconnaissance of enemy routes of movement and area of deployment of artillery, and for selection of command surveillance post and surveillance posts. Artillery reconnaissance groups are organized in artillery batteries and battalions.[55] Each group normally consists of several staff officers, the commander of a firing subunit or unit, an engineer subunit, and communications subunit with necessary weapons and equipment.[56]

The Soviets use adjustment-reconnaissance or spotter aircraft for artillery reconnaissance. These helicopters are primarily used for detection of targets not reconnoitered by ground posts. Their main task is to determine target coordinates and then control fire against them.[57]

Artillery reconnaissance is also conducted with what the Soviets call artillery instrument reconnaissance (AIR). This is conducted by various devices for observation and range-finding. It consists of optical, sound, radar, and radio-technical means of detection.[58]

The principal methods of artillery reconnaissance are observation and range-finding by using optical and electro-optical devices, sound-ranging, radar- and radio-technical posts, artillery reconnaissance troops, artillery fire; study of captured enemy documents, weapons and equipment; and study of unexploded shells and missiles.[59]

Optical reconnaissance is conducted from special artillery mobile surveillance posts (APNP) or special vehicles. These posts are equipped with binoculars, artillery periscopes, stereoscopic range-finders and reconnaissance theodolites. Under favorable conditions optical reconnaissance can detect targets up to a range of about 20,000 meters. However, light-measuring devices are suitable only at long range to pinpoint heavy weapons.[60]

Sound-ranging reconnaissance is conducted by sound-ranging posts. They detect and determine coordinates of SSM/SAM and mortar batteries. As a rule, these posts are deployed at a distance 2-2.5 kilometers (in the offensive), or 3-4 kilometers (in the defense) from the forward line of one's own troops (FLOT). The distance between adjacent posts, which makes up the acoustic base, must be 1-1.5 kilometers.[61]

Radar artillery reconnaissance is conducted at radar posts for the detection of moving targets (SNAR), and radar posts for the detection of enemy firing mortars (ARSOM). SNARs are tasked with reconnaissance of mobile ground and water surface targets and servicing the fire of its artillery. ARSOMs serve to detect and locate enemy mortars and howitzers and determine the trajectories of their shells. They are either an integral part of the artillery units or are assigned to them.[62]

Reportedly, a short-range field artillery radar can detect a crawling soldier at a range of up to 1,300 meters, while soldiers on the move can be detected up to about 3,500-3,700 meters. Moving vehicles can be detected up to 800 meters. Medium-range radars are tasked with search, detection, and identification of moving targets in a radius of up to 18,000 meters. They can detect a crawling soldier up to 6,500 meters and moving vehicles or tanks up to 18,000 meters.[63]

Radio-technical artillery reconnaissance is tasked for detection and localization of enemy radar posts for SAMs, field guns, antiaircraft (AA) guns, reconnaissance posts of mobile ground troops, posts for vectoring of tactical aviation aircraft on the ground, and RPVs. This form of reconnaissance is conducted at radio-technical posts.[64]

Radio-electronic or electronic reconnaissance is the method for obtaining information on the enemy with the help of electronic sensors. The main forms of this type of reconnaissance in the Soviet Ground Forces are radio, radio-technical, radar, radio-thermal (thermal vision), thermal (IR), laser, TV, and sound reconnaissance.[65]

Radio-electronic reconnaissance is capable of obtaining highly accurate and timely data on the combat and numerical composition of enemy troops, their disposition, grouping, and nature of activity at long range.[66]

The principal methods of conducting radio and radio-technical reconnaissance are search, observation, and direction finding (DF). This makes it possible to know the state, location, and nature of activities of targets on the ground and in the air. It can also determine the launching area of missiles, firing positions of artillery, and trajectories of missiles and artillery rounds.[67]

Radio reconnaissance is tasked with obtaining information on hostile radio transmissions and locating hostile transmitters by using DF techniques. This type of ground reconnaissance is conducted primarily by radio intercept posts.[68] Soviet motorized rifle divisions normally have attached to them a radio-electronic combat company from the front's long-range reconnaissance battalion. This company is deployed so that it can cover one NATO brigade. VHF/UHF reconnaissance gear is deployed near the FLOT. This gear can detect targets at ranges of 40-60 kilometers. By using HF ground waves the range is increased to about 80 kilometers. The precision of DF depends on the frequency band of hostile transmitters and technical conditions of posts where DF is located. Reportedly, a precision of 2-3 degrees in bearing is possible.[69]

Radio-technical reconnaissance is aimed at obtaining information on type, purpose, and location of operation of enemy radio-electronic assets, specifically radars, radio navigation and radio control posts.[70] The role of radio-technical reconnaissance has increased considerably in recent years because of the existence on the modern battlefield of a very large number of radars, weapons control systems, and radio navigation posts.[71] This type of reconnaissance is conducted at radio-technical posts deployed as close as possible to the FLET.

Radar reconnaissance is aimed at obtaining information on targets and determining their coordinates or parameters of movement.[72] It is conducted at radar posts by radar teams. The basic methods used in radar reconnaissance are search and radar surveillance or tracking of the target. The Soviets make a distinction between radar reconnaissance of aerial targets and ground targets. They also differentiate between the reconnaissance of firing positions of missile launchers, guns, howitzers, and mortars.[73]

Chapter 3

FIRE

Fire is one of the main prerequisites in the effectiveness of any strike; this is particularly true when with respect to recce-strike complexes in particular. The Soviets describe fire as the employment of diverse types of weapons to destroy the target. It is one of the basic means of defeating the adversary in a battle. Effectiveness of fire is obtained through its high precision, surprise, maneuver, and skillful control.[74]

The Soviets distinguish between the fire of artillery, tanks, armored personnel carriers [APC], semiautomatic weapons and rifle fire, and fire by aviation. Fire under modern conditions also includes missiles armed with conventional warheads.

Fire can be conducted to either annihilate, destroy, suppress, or exhaust the target. It can be delivered either directly or indirectly and can be conducted by firing single rounds, rapid fire, battery fire, firing in bursts, and firing in salvos.[75]

The main objective in delivering fire is to achieve what the Soviets call fire superiority, i.e., the ability of firing assets to successfully carry out their assigned fire tasks, while preventing the enemy from counteracting with his own fire assets.

Fire superiority is achieved by creating numerical and qualitative superiority in fire assets against other types of targets. It is attained by preemptive fire, surprise, high effectiveness, and massing of fire on the axis of the main blow. It is also accomplished by the continuous "struggle" against fire assets of the adversary.[76]

The Soviet term "fire preparation" [ognevaya podgotovka] includes not only artillery support, but also the fires delivered by operational-tactical and tactical missiles, aviation and air defense fires. At the tactical level fire support also includes fire by tanks and antitank weapons. These two are executed as required to support maneuver units as they expand deeper into enemy rear areas.[77] However, the Soviets, despite their recent emphasis on conventional warfare, still give great attention to the fires delivered by nuclear operational-tactical and tactical systems.

Until recently the Soviets envisaged three phases in the fire support of an attack: fire preparation, fire support, and fire accompaniment. Fire preparation of the attack is the period of fire destruction of the enemy immediately preceding the

movement of one's one's troops into attack positions. It is conducted by the fire of artillery and strikes of missile troops and aviation. During an offensive, fire preparation is carried out at the time of the breakthrough of the enemy's defensive line, or the introduction and engagement of the enemy's second echelon or reserve. This distance is up to 15 kilometers behind the FLET.[78] In the defense, a fire preparation is conducted during the counterattack or strike by one's own troops or forces (see figure 2).

The main objective of fire preparation is the annihilation and suppression of enemy nuclear and chemical assets and physical destruction of enemy defenses in the breakthrough zone. Other targets include artillery, tanks, antitank weapons, manpower, command posts, and other important objects in the tactical depth of the enemy defense. Fire preparation is also directed against important individual targets in the operational depth of the enemy defense. Thus, the basic objective of fire preparation is to attain fire superiority.

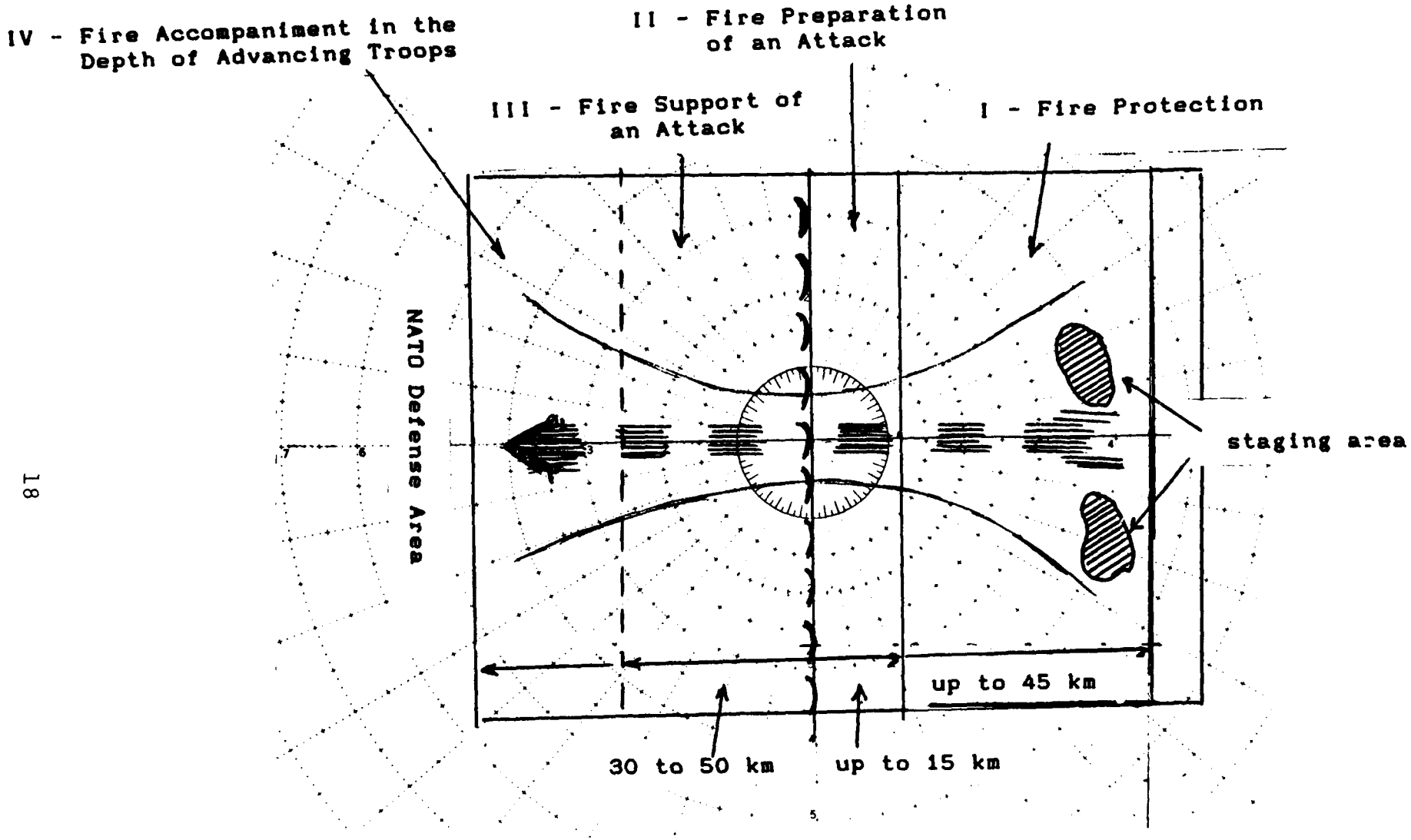
An integral part of fire preparation is artillery and aviation preparation of the attack. Fire preparation can consist of one or several fire raids by artillery, and one or several strikes of missile troops and aviation.[79]

Fire support of the attack is the period of fire destruction delivered by the fire of artillery and strikes of missile troops and aviation. It essentially consists of the successive destruction of the adversary during an attack by one's own troops and forces. Fire support is conducted 30-50 kilometers behind the FLET.[80] The aim is to support an attack, and prevent fire and maneuver of enemy forces and assets. It also has the objective of suppressing or annihilating enemy manpower and firing assets. Fire support usually continues until one's own troops advance to the depth of positions of an enemy first-echelon brigade or regiment.[81]

Fire accompaniment is the period of fire destruction of the adversary by the fire of one's own artillery strikes by missile troops and aviation during the advance of one's own combined arms subunits, units, forces, and formations into the depth of the enemy defense. Fire accompaniment usually starts beyond 30-50 kilometers behind the FLET.[82] It encompasses continuous destruction of enemy manpower and fire assets opposing the attacking forces, as well as destruction of enemy reserves.[83]

All types of fire will be conducted according to a specific fire plan. This is a document which provides the order and sequence of fire tasks of subordinate fire assets. It normally contains a list of assets to be employed for defeat of enemy groupings, the required degree of damage or destruction, and the

Figure 2: FIRE SUPPORT OF TROOPS



general sequence of fire during the execution of operational or tactical tasks by one's own troops.

The fire plan also specifies the time required to bring up one's own fire assets and their subsequent deployment to fire positions, and the continuity and disposition of fire preparation and methods of fire support. The plan must also specify tasks of fire assets, requirements and distribution of ammunition according to assigned tasks, and periods of fire preparation, and it must describe details of cooperation between respective fire assets.[84]

Conventional fire support is provided by the fire of tube artillery, MRLs, short-range ballistic missiles (SRBM) fitted with conventional warheads, front and army aviation, and air defense troops. Because of the reduced possibilities of using nuclear weapons in a coalition war, the Soviets have modified their fire support concept. The current concept envisages an increase in both quantity and quality of fire in each phase of the offensive. Another change is the introduction of a new preliminary phase called fire support of the advance from the depth. This phase envisages the fire support of Soviet attacking units as they move from their departure areas deep in their own rear to the lines of deployment for the attack against enemy troops. This initial fire support phase also requires the Soviet front commander to use long-range missiles and ground attack aircraft to strike enemy systems deployed in the depth of the defenses immediately as his own forces start to advance from their assembly areas.

As their own troops advance closer to the adversary, the Soviets initiate the front's medium- and short-range artillery fires, supported by heavy air and ground-based air defense fires. The main objective is to destroy enemy short-range artillery. This phase of fire support is required to protect Soviet troops against strikes by surviving enemy ground attack aircraft and artillery.[85]

Another change in the Soviet conventional fire support concept is the introduction of integrated fire destruction of the enemy. This term is used to describe continuous and integrated fire to achieve maximum, simultaneous destruction of the enemy. The new fire support concept is designed to ensure overwhelming fire superiority on the battlefield. It must be massive and delivered quickly to preclude the adversary's recovery prior to the assault on his positions by attacking Soviet ground troops.[86]

The new integrated fire support concept requires a much improved C3 system and centralized employment of all combat arms, aimed to achieve coordinated strikes by all available types of fires. It also requires a drastic increase with regard to both volume and density of conventional fires. This, in turn,

leads to a rather large increase in the expenditure of ammunition. The integrated fire destruction of the opponent necessitates the introduction of new long-range, more mobile conventional fire support platforms. Obviously, the greater the range of fire platforms, the less concentration they require. Greater mobility of fire platforms allows a continuous and higher volume of fire support for advancing or attacking units.[87]

Artillery fire is the fire of artillery aimed at defeating the adversary. It is conducted either by the method of direct aiming or indirectly from concealed firing positions. It can be delivered by individual weapons, batteries, or simultaneously with several artillery subunits, units, and forces against one group of targets. The aim of artillery fire is annihilation, destruction, suppression or exhaustion, and neutralization of the target.

In an offensive combat action, artillery fire is organized according to the period of fire destruction of the adversary. In defense, artillery fire is conducted according to the tasks of Soviet forces and axes. Fire tasks can be executed by single guns, battery fire, rapid fire and fire in salvos. For swift defeat of the target the Soviets will use the fire raid.[88]

The basic form of the employment of Soviet artillery is the artillery offensive [artilleriyskoye nastupleniye]. Its main objectives are direct suppression of enemy defenses and provision of continuous support for Soviet tanks and infantry.

As a rule, the artillery offensive is preceded by a lengthy and thorough reconnaissance and systematic target acquisition. A detailed list of targets is drawn up. The primary objective will be the destruction of enemy nuclear delivery systems, followed by the destruction of command posts, communications centers, radar observation posts, field artillery positions, air defense assets, troop reserves, and strong points.[89]

Until recently, the artillery offensive consisted of three main periods: artillery preparation, artillery support, and artillery accompaniment.[90]

Artillery preparation of an attack is a combat action of artillery immediately preceding the attack of Soviet tanks and infantry. It concludes with the annihilation or suppression of the target. Artillery preparation aims to deny the adversary the ability to resist the attacking troops. It ends when the attacking Soviet troops reach their respective attacking positions.

In practice, fire preparation starts with several minutes' firing at maximum rate, followed by a relatively long period of sustained fire, and ends with a short burst of rapid fire. Only

enemy batteries which have actually opened fire will be engaged, so that front-line targets can receive the full weight of the preparation.[91]

The duration and disposition of the artillery preparation and the consumption of ammunition is determined by the operation or battle plan. This element will depend on the nature of the enemy defense, size and nature of enemy troop groupings, and required degree of destruction of the targets. It will also depend on the tasks assigned to aviation, missile troops, and tanks. The Soviets postulate that artillery preparation can consist of one or several fire raids.[92]

Artillery support of an attack follows the artillery preparation. This is a combat action of artillery at the beginning and in the course of an attack by one's troops. It concludes with continuous successive fire destruction of the targets in front and on the flanks of one's own attacking troops. The main objective is to ensure the uninterrupted movement of Soviet troops.[93] The fire during the artillery support of attack is coordinated with the movement of tanks and infantry.

Artillery accompaniment of troops as they advance into the depth of the enemy defense follows the period of artillery support. It is conducted with the artillery fire and strikes of missiles fitted with conventional warheads. The principal aim of artillery accompaniment is to destroy newly-emerged or restored targets, and simultaneously and continuously to destroy targets located in the depth of the enemy defense.

The basic methods of artillery accompaniment are single or double successive concentrated fire (PSO), single or double firing waves by using concentrated fire (SO), and concentrated fire on call by the commander of the attacking subunit.[94]

Recently, a new phase, artillery protection, was added to this list. This new phase is intended to suppress enemy weapons, especially long-range systems, that could break up one's own attack.[95]

The Soviets calculate firing norms against area targets of various types on the basis of rounds delivered per hectare (a hectare is an area 100 square meters or 2.47 acres). Fire concentration can be conducted against a single target or a group of targets located in the same area. Each weapon is assumed to neutralize an area, given in hectares, depending on the time allotted. MRLs are used only against the most important targets. They fire single salvos. If several batteries conduct fire, the target can be broken down into subareas for each battery, or fires can be superimposed to achieve high densities of fire for a short time.[96]

The Soviets use the concept of density of fire [plotnost' ognya] in planning their fires. The simple qualified norms of rounds per type of target have been recently supplemented with density norms that call for no fewer than 25-30 rounds per minute per hectare on most targets, and even greater densities on highly mobile targets, such as tanks. To achieve these densities and the necessary strike effect, at least one 18-tube artillery battalion will be required to fire a mission previously fired by a single 6-tube battery. This, in turn, at least triples the amount of artillery required by the commander of maneuver forces. Note that the new fire density norms, combined with the integrated fire destruction concept, require a huge increase in the volume of missile and artillery fire available to Soviet commanders at all levels.[97]

Artillery fire is conducted by the respective artillery group. This is described as an artillery subunit, unit, or a force created during an operation or battle for fulfilling tasks in the interest of combined arms units and formations. It is subordinate to the respective combined arms commander. The composition of an artillery group can change in the course of an operation or battle.

The Soviets differentiate between army, division, and regimental artillery groups. The army artillery groups (AAG) are tasked with fire missions in an operation in support of the main group of armies. They are used to deliver fires against enemy tactical nuclear delivery systems and artillery. These groups are also employed to defeat enemy reserves and reinforce the fire of one's own artillery and first echelon on the main axis. An army artillery group can be split into subgroups and assigned to divisions of the first echelon operating on the main axis.[98]

A division artillery group (DAG) is tasked to fight against enemy tactical nuclear weapons and artillery. It can also be used against enemy reserves, command posts, and EW assets. These groups will be employed to reinforce the fire of regimental artillery groups (PAG) on the main axis of advance. A divisional artillery group is normally composed of several battalions of artillery of one or more calibers. The regimental artillery group is tasked to destroy enemy manpower, mortars, antitank and other firing assets.[99]

Until the end of the Great Patriotic War, the Soviets used the term "aviation offensive" to describe the form of employment of aviation in support of ground offensive operations. This term has been gradually abandoned and replaced by several other terms. Specifically, aviation support of ground offensive operations is carried out by air preparation, support, and accompaniment.[100] Coordination of air strikes in support of ground forces is normally the responsibility of the air army

staff working closely with the front artillery staff and ground force commanders.[101]

Air preparation of an attack is a form of combat action of aviation prior to the attack of ground forces. It is usually conducted simultaneously with artillery preparation. Air preparation is carried out by frontal or army aviation, and sometimes strategic aviation.

In the course of air preparation the first targets to be hit are the enemy tactical nuclear delivery systems, command posts, tanks, and artillery in their concentration areas. Other targets include enemy points of resistance, aviation deployed on airfields close to the FLOT and crossing sites.

The Soviets distinguish between preliminary and direct air preparation. The former will be conducted 1-3 days before the start of a ground offensive. The latter will be carried out 10-15 minutes to 1 1/2-2 hours before the ground attack.[102]

Air support of an attack is conducted by frontal aviation in support of ground troop formations. It starts with the movement of troops to attack. The first task of air support is annihilation or suppression of enemy tactical nuclear assets, reserves, command posts, strong points, and conventional fire assets.[103]

In the Soviet concept, air accompaniment does not correspond to what in the West is called air interdiction and close air support, but represents essentially the employment of one's own air assets in an offensive to supplement other types of conventional fire.

The Soviets describe air accompaniment of advancing ground forces as a form of combat actions by aviation units to achieve uninterrupted cooperation with the troops in the depth of the adversary's defense. The principal targets in this phase of air support are enemy operational reserves, tanks, missile launchers, artillery, and strong points. Air accompaniment is conducted by units of frontal and army aviation.[104]

Air accompaniment consists of two main phases: a preparatory attack and strikes in support of advancing tanks and motorized-rifle units after the attack begins. For the most part, air attacks in the preparatory phase are coordinated closely with artillery barrages to extend the range of fire.

With respect to fire assets, the principal weapons platforms used in Soviet recce-fire and recce-strike complexes are aircraft, short-range ballistic missiles (SRBM), and artillery. Presently, each command echelon from division to a TVD command has its own aviation assets.

The major part of frontal aviation air assets consists of Su-17 Fitter and MiG-27 Flogger fighter-bombers. These aircraft are tasked for tactical defense suppression and interdiction missions. To complement the fighter-bombers the Soviets use the Su-24 Fencer aircraft for deep interdiction. Recently, a new variant of the MiG-25 Foxbat F, specifically designed for defense suppression, entered service. The AS-11 ARM carried by the Foxbat-Fs is used to attack NATO air defense missile belts from stand-off ranges. Older tactical fighters assigned to the frontal aviation such as the aging MiG-21 Fishbeds are being replaced by the more advanced MiG-29 Fulcrums. The new Su-25 Frogfoot ground attack aircraft are used for close air support and battlefield air interdiction missions.[105]

To free fixed-wing frontal aviation for deep attack in the TVD, the Soviets have resurrected the concept of army aviation. The helicopters are assigned to fronts and down to divisional level. The standard attack helicopter, the Mi-24 Hind is used to support counterattack or contain enemy penetration. The new Mi-28 Havoc attack helicopters supplements and eventually will replace the Hinds. The newest helicopter, Hokum probably is used for a new mission; battlefield air defense and striking enemy antitank helicopters and lower performance fixed-wing ground attack aircraft.[106]

Operational-tactical and tactical battlefield missiles assigned to front and army missile brigades have been significantly improved in recent years. The older, inaccurate Scud-Bs/Frog-7s have been replaced by more advanced and highly accurate SS-21 Scarab missiles. Besides improved reliability and accuracy the SS-21s also use new and more lethal conventional munitions.[107]

The Soviets planned to replace Scuds with SS-23s but this missile will be eliminated under the terms of the intermediate Nuclear Forces (INF) treaty. In its place, an improved version of the Scud, the SS-1e Scud-D, will be introduced. The advanced version of the SS-12 Mod 2 Scaleboard is to be scrapped under the terms of the INF Treaty.[108]

Besides their greater accuracy, SRBMs, owing to their mobility, probably have higher survivability than nuclear-capable aircraft. They also offer an improved chemical warfare capability. Reportedly, a single attack with chemical weapons on an air base could halve the sortie rate.[109]

The Soviets possess a huge number and great variety of artillery pieces of all calibers. Since the early 1980s the Soviets have replaced towed artillery with self-propelled (SP) 122-mm 2S1 and 152-mm 2S3 howitzers. In tank and motorized-rifle divisions the SP 122-mm 2SI, 152-mm 2S5 Gatsynt and 203-mm

2S7 guns are replacing the older towed models. Reportedly, these new guns and howitzers are capable of firing chemical rounds, as well as enhanced blast and subprojectile warheads.[110]

The larger calibers obviously give better impact per unit of artillery and also allow deployment of submunitions such as minelet rounds. The Soviets have also been focusing on increasing the rate of fire of their field artillery. An example is the new 152-mm 2S5 SP gun and its towed variant 152-mm M-1976. Both guns are capable of firing minelet rounds. However, there is a drawback in combining higher rates of fire and larger calibers for guns. The new Soviet guns, although having improved firepower and higher mobility than their predecessors, can carry only a minimal quantity of ammunition. Therefore, they require an entire family of specialized ammunition resupply vehicles.[111]

The Soviets also use a large number of several models of mortars to provide fire support for their troops. The 240-mm 2S4 SP mortar introduced into service in the mid-1970s have recently been fitted with a powerful new concrete piercing round. For short-range support the Soviet Ground Forces are receiving a new SP 120-mm 2S9 mortar designed in 1981.[112] Also, Soviet troops began to receive a new 120-mm mortar designated 2S12.[113] The self-propelled mortars have increased Soviet ability to strike mobile targets and saturate areas with fire.

The 122-mm BM-21 remains the standard division MRL. It is being currently supplemented and replaced by the new 36-tube MRL designated Grad-1. This system is designed for the mass delivery of chemical and conventional high-explosive [HE] rounds. One salvo can deliver a lethal concentration over 24 square kilometers. Some weapons with very high rate of fire such as the 240-mm BM-24 have recently been provided with specialized resupply and reload vehicles.[114] The BM-24s were used in Afghanistan and were fitted with incendiary sub-munitions.[115]

The new 220-mm BM-22 Uragan MRL (previously erroneously designated BM-27) has a 40-km range and rate of 16 rounds per minute. It reportedly uses HE bomblets and two different types of minelets.[116] The BM-22 system has been provided with a specialized reload vehicle (two per launcher), enabling all 16 tubes to be reloaded in several seconds. This considerably increased the BM-22's rate of fire and give it offensive/defensive capability. An even larger 280-mm MRL system is believed to be under development.[117]

Many Soviet large caliber guns can use either conventional rounds or rocket assisted projectiles (RAP). The Soviets recently have introduced into service two new types of warheads for their guns and rocket launchers such as the cluster bomblet units (CBUs). The latter are fused to burst above ground and their bomblets are projected outward, resulting in an increase of

their lethal radius as much as 20 times in comparison with HE shells. The Soviets also recently introduced fuel-air explosives (FAE) as warheads for their rocket launchers. This type of ammunition is essentially a gas that spreads after the warhead bursts. The gas detonates several seconds later by means of delayed action fuse and creates a severe overpressure over a larger area. More importantly, FAE munitions cover the area more completely than explosive bomblets. Consequently, all the targets susceptible to destruction by overpressure within the FAE's radius are completely destroyed. Because the gas is heavier than air, it sinks into trenches and foxholes. The FAE is especially effective for clearing mines.[118] The 220-mm BM-22 MRLs are reportedly fitted with the FAE warheads and are possibly used in the latter role.[119]

Chapter 4

COMMAND AND CONTROL

The most critical part of any recce-strike or recce-fire complex is the command and control system. The Soviets hold that the operational-tactical system must have the capability to reconnoiter mobile or stationary targets on the ground at a depth of 200-300 kilometers.[120] The collection, evaluation and transmittal of data require true mobile ground-based control and evaluation units integrated with ground troops and air forces. The primary sources of information are reconnaissance aircraft. However, other sources of information on the targets are used as well. The acquired data are computerized and then used to select (with the prepared target programs) the most suitable forces to carry out the strike. The reconnaissance data thus serve as a basis for a decision making.[121]

Soviet operational-tactical and tactical C3 is highly centralized and reportedly very rigid. C3 is the area in which the Soviets would have the greatest difficulties in accomplishing their assigned objectives in wartime. Perhaps one of the most serious deficiencies of the Soviet C3 system is in its technical elements. This will probably have the greatest effect on the overall performance of the Soviet recce-strike and recce-fire complexes.

One of the most serious problems for the Soviets is not a shortage of computers but a lack of spare parts and repair capabilities. Another problem, especially at the operational and strategic levels, is that data transfer and the number of users is strictly controlled. The large computer centers are dominated by a few specialists on whom everyone else is dependent. Thus, Soviet efforts to further miniaturize and decentralize their automated control systems will meet with resistance, because it would mean loss of control of and greater independence for the end users.[122]

Command and control of individual recce-fire and recce-strike complexes is exercises from specially designated command posts. The Soviet battlefield command post system usually consists of one main and one forward command post, and one or more alternate command posts. These can be stationary or mobile. There also exist various specialized command posts, each performing a specific function.[123] As a rule battlefield command posts are located in places which are well concealed. All command posts are provided with a variety of communications assets. The tactical or operational-tactical commander's communications center is normally separated at some distance from the main command post. Reportedly, command posts will move along different routes than the troops. They will also maintain radio communications on the move.[124]

The number and size of battlefield command posts depend upon the level of the command echelon. They are dispersed within each command echelon to prevent the loss of more than one post in case the enemy uses a single, medium yield, tactical nuclear weapon. Command posts are generally duplicated so that an alternative C3 system is instantly available should the main command post become inoperative for any reason.

At division level, the emphasis is on small, self-contained and highly mobile command posts. These are capable of keeping up with the pace of the battle and the changing tactical situation. In practice, the main command post of a division is usually located 5-10 kilometers behind the FLOT. This post is the central point of control for deployment, movement, reconnaissance, and logistics. It is fully functional during movement. The communications center is a few kilometers behind the main command post.[125]

The commander normally operates from a forward command post (PKP) located well forward on the main axis of combat action. This distance is normally about 5 kilometers behind the FLOT. Mi-8 Hip helicopters can also be used as forward command posts. One or two alternate command posts (ZKP) are manned with a basic staff to take over command and control functions if the main command post is put out of action. These posts are located 5-15 kilometers behind the front.[126]

Regiments and smaller units may also establish a main command post, an alternate command post, and a command observation post (KNP). This post would be normally mounted in a specially equipped APC.[127] It serves to control combat operations, battlefield surveillance, reconnaissance assets by the respective commander.[128]

Each artillery battalion and battery has a command observation post that serves simultaneously as command post, forward observer, and fire direction center. These posts are not equipped with guns but are positioned forward with the front-line troops. This allows the artillery commander to make on-the-spot decisions about target acquisition, identification, and engagement. Target acquisition and fire control are thus handled with the most experienced officer instead of a forward observer who might or might not be very experienced. At the same time, the artillery command post is the most vulnerable element of Soviet artillery. Once its communications are disrupted or is physically destroyed, the Soviet artillery subunit or unit would have a hard time being effectively used.[129]

A recce-strike complex may use the Il-76 Mainstay as an airborne command post. This aircraft replaced the much less capable Tu-126 Moss. Its look-down radar is capable of detecting and tracking the movements of ground troops, aircraft, and cruise

missiles flying at low altitudes within a 100-km range. The Mainstay is primarily intended to operate with MiG-29s, MiG-31s, and Su-27s.[130] Il-20 Coot-Bs and a version of the Mi-6 Hook-C helicopter are used as airborne command posts.[131]

With respect to automated control systems, the Soviets maintain that automation is the general trend in further improving troop control. The need for automation of control stems from the growing complexity of combat actions and from an increase in pace and scope, the intensity of combat, the increased importance of the time factor, and high efficiency in controlling troops.

The first generation of Soviet command information systems was developed in the mid-1970s. However, because of their size and weight, the first Soviet generation of computers were ill-suited for front-line use. This was the main reason that the Soviets put the greatest emphasis on the development of strategic C3I and administrative data processing.[132]

The first large Soviet computers were the Ryad-1 and Ryad-2; copies of the IBM 360 and IBM 370 systems. The El'brus-1 series was modeled after the Burroughs B7700. The E5-1040 Robotron was developed in the German Democratic Republic. The Soviets initially put little emphasis on a communications network among their large computers. Hence, data links were maintained by using punch cards and magnetic tapes.[133]

By the late 1970s the Ryad-2 computers had been deployed down to division level. Division artillery command posts were also reported to have a similar system. Information is transmitted by means of data links between the ACRV-2 command vehicles. A wide range of improved box-body headquarters vans have appeared since the late 1970s to provide computers and communications systems with mobility down to battalion level. Also, satellite communications [SatCom] allow the Supreme High Command access to front-line units.[134]

The Soviets extensively use mini-computers in their missile and artillery command posts. The first Soviet-produced mini-computers were the Elektronika SM1 through SM5 series, followed by the SM50 and SM54 series. These computers probably used U.S. Intel--8080 chips. The Elektronika S60, built in the early 1980s, was reportedly modeled on the Western LS 11/2 or DEC PDP11 series. The K1800 chip used in the newest Soviet 16-bit microcomputer is probably a copy of the Motorola M10800.[135] One of the more advanced Soviet mini-computers used in automated data processing role is the Pravets-82.[136] Undoubtedly the Soviets will continue to introduce more advanced mini-computers to serve in variety of role with their firing assets and command and control posts.

Although fast, Soviet computers are also highly unreliable. Currently, the main deficiencies of Soviet computer technology are reliability, high energy demand, and large size. For example, Soviet mini-computer producers guarantee error-free work for only 200 hours, while computers produced in East Germany can work for about 500 hours before breaking down. In contrast, the current world standard for error-free work of mini-computers is between 20,000 and 40,000 hours.[137]

Depending on the command echelon in the Soviet Ground Forces there exist automated control systems for the following:

- army command posts;
- strategic weapons;
- command of ground troops in a TVD;
- operational-purpose weapons;
- combined arms units
- tactical weapons.[138]

The Soviets hold that in recent years there has been a shift in the Ground Forces toward wide use of subsystems of automated control systems by forces, units and subunits of all types of reconnaissance, field artillery, and army aviation.[139]

With regard to their technical purpose, the four basic groups of automated control systems (ASU) used by the Soviets are for troops, support of combat actions of troops, administrative-managing control, and support of scientific-research work and long-range planning.[140] The Soviets also differentiate between automated systems of weapons control, troop control, and communications systems. The Soviet battlefield system includes all these elements plus reconnaissance command systems.[141] For our purposes here, only automated control systems for troops, weapons, and communications will be described in some detail.

The automated troop control system (ASUV) is described as the process of developing and introducing into the work of staffs electronic computer equipment and various highly efficient technical systems associated with computers, together with appropriate information and programming equipment, for the purpose of increasing troop combat readiness and efficiency in controlling troops.

The automated troop control system is used for automated collection, transmission and evaluation of information, resolution of collection tasks, carrying out of mathematical modelling of a combat action, and forecasting of the situation. It is also used for the computer planning of combat actions, management of resources, preparation of data for displaying and evaluating the situation, weapons control, compilation of reference data, preparation of data for making operational decisions, processing of qualitative data, evaluation of the

effectiveness of decisions, and evaluating the results of combat actions.[142]

The most important processes of computer activities are scientific substantiation of the plan, prediction of possible results of enemy use of weapons of mass destruction, and evaluation of the possible consequences of using one's own conventional weapons and other weapons. It also involves the evaluation of the relative effectiveness of variants of a decision and other estimates needed for making optimum decisions and planning troop actions.[143]

The automated control system of combat means (ASU-BS) or automated weapons control system (ASUO) is described as a man-machine system for automated acquisition and processing of information required to optimize control of weapons so that they can be employed effectively. The tasks of automatic or automated target detection, destruction, and weapons guidance are resolved with the aid of this type of control system.[144]

The functions performed by the command post crews of the automated weapons control system are combined with the system's functional algorithms. At the same time the level of information provided during interaction with the computer is coordinated with the physiological capabilities of personnel and the technical capabilities of the hardware. The Soviets claim that the trends in the development of automated weapons control systems are increased automation, enhanced equipment reaction times, increased precision in guidance of weapons to a target, and use of multi-purpose automated weapon control systems.[145]

The Soviets widely use various automated fire control systems. These include informational, informational-reconnaissance, and command sub-systems. They allow for collection of data on targets and one's own weapons, and planning of fire and target distribution.[146]

Special purpose automated control systems (ASU-SN) serve to process information on missile attacks, and collect and evaluate data of various reconnaissance, hydro-meteorological, or meteorological systems.[147]

The most crucial element in the functioning of any command and control system for troops and aviation is fast, reliable, and secure communications. With regard to troop communications, the Soviets stress simplicity, durability, and, above all, survivability through redundancy.[148] The Soviets reportedly have enormous problems in communications systems linking the key components of their C3I system. The cable links between stationary command centers are well developed, as are satellite data links; however, these lines are at the same time highly vulnerable to the interruption by enemy action. Not only do the

Soviets reportedly not have links between various computer systems, but also there are hardly any broad-based computer networks.[149]

The Soviets currently possess an extensive network of cable and open-wire lines, and radio-relay links for communications between the main command posts and respective command posts in the field. In addition to the cable-linked stationary command centers, there are also lines of communications among army groups down to special division level. Also, SatCom with fixed and mobile ground stations and VHF, HF, and VLF radio beacons have great importance in the Soviet battlefield C3I system.[150]

With regard to communications, there are the following networks in the Soviet ground forces:

- command nets for transmission of battle orders;
- control nets for conduct of combat actions and fire control;
- staff nets for staff organization;
- aircraft early warning nets;
- nets for rear service support.[151]

The Soviets pay great attention to all aspects of radio security. Radio concealment and deception are aimed at preventing the adversary from obtaining data on deployment, strength, and intentions of one's own troops. This is achieved by extensive use of visual-optical signals and limiting the duration of message transmittal.

The Soviets reportedly maintain very strict net discipline. In many cases the equipment in combat vehicles below company level is kept in receive mode only. However, the Soviet tactical communications in the Ground Forces are relatively inflexible compared with those in NATO forces. [152]

Radio security is enhanced by using automated enciphering machines, reducing the output of the transmitter to a minimal level, and using one-sided voice radio. Secrecy in radio communications is greatly improved by strictly maintaining radio discipline and observing all regulations and norms for the work of radio equipment.

The Soviets broadly employ various automated communications systems (ASS) in command and control of their troops and forces. These systems are an integral part of the automated system of troop control or automated weapons control system. An automated communications system consists of a multiple network of diverse communications channels. The basic principle in the work of an automated communications system is the integrated use of all type of communications; automation of information collection, processing and distribution; and automation of the control

systems and the communication centers. The Soviets distinguish between channel switching, message switching, and channel and message switching automated communications systems.[153]

The use of an automated communications system provides the automated exchange of information in both analog and discrete forms. The first is used in the operational telephone communications system for the command element and staffs of various command components. In this case, subscribers are connected automatically according to the number dialed and the subscriber priority. The discrete form establishes an interchange of messages between automated information collection and processing facilities, and exchanges voice communications of command post officers. This form of communications is the most flexible and reliable, because it ensures high communications security and broad application of computer technology for information collection and processing. The latter, in turn, considerably increases traffic flow on the lines of communications allowing for the establishment of high-speed communications between command posts. The discrete form also simplifies the coupling of various communications means with each other and increases the reliability of the transmitted information.[154]

Electronic warfare, or, as the Soviets call it, radio-electronic combat [radio-elektronnaya bor'ba] (REB) has a crucial role in the effective employment of recce-fire and recce-strike complexes. The Soviets hold that the recent local wars, especially the Israeli invasion of Lebanon and Falklands Conflict, were marked by high intensity and great use of radio-electronic assets. Radio-electronic combat has become a decisive factor in war on land, at sea, and especially in the air.[155] When both opponents can inflict quick, destructive strikes, the side that is superior in radio-electronic combat may achieve success.[156]

Radio-electronic combat until quite recently was an integral part of the support of combat actions. However, the Soviets have come to regard radio-electronic combat as a composite of both combat actions and operational or combat support. The trend is to include radio-electronic combat as a type of combat action instead of just one component of operational or combat support. Currently, the Soviets define radio-electronic combat as the aggregate of combat actions aimed to reveal and subsequently jam the opponent's radio-electronic assets and protect one's own radio-electronic assets and systems. Radio-electronic combat measures are combined with destruction of enemy radio-electronic assets.[157]

The term "radio-electronic combat," though awkward, accurately describes the Soviet concept. This term does not have a uniformly accepted equivalent in Western military terminology.

"Radio-electronic combat" in the Soviet context includes all the elements that in the West are known as "electronic warfare" plus many elements of camouflage such as radio, radar, and sonar masking, and deception and misinformation. Many elements of camouflage are mostly protective in nature, but radio camouflage also contains an offensive element in radio misinformation, the use of fabricated information one's own communications, and penetration of enemy radio nets to deceive him.[158]

Radio-electronic combat consists of three main components: reconnaissance, protection, and suppression. More recently the Soviets began to substitute the term "radio-electronic suppression" with the term "radio-electronic counteraction", while the term "radio-electronic protection" has been replaced by the term "counter radio-electronic counteraction."[159] To make the situation more confusing, however, some Soviet authors continue to use the former terms. The terms "radio-electronic suppression" and "radio-electronic counteraction" are often used alternately in the same context.

The Western counterparts to the individual components of the Soviet radio-electronic combat are not necessarily identical. Radio-electronic suppression or counteraction does not equate directly to electronic countermeasures (ECM), because this term includes some elements of protection of radio-electronic assets or electronic counter countermeasures (ECCM). The Soviets apparently consider neutralizing, i.e., damaging or destroying the opponent's radio-electronic assets, to be a part of radio-electronic suppression. In another example, radio-electronic protection includes protection from terminally guided weapons, specifically missiles and homing torpedoes.

The Soviets maintain that by suppressing electronic reconnaissance and communications systems, modern electronic suppression assets enhance secrecy in preparing and achieving surprise in initiating combat operations. They make it difficult for their opponents to move his assets and adjust his fire. Electronic suppression assets considerably reduce one's own losses by blinding enemy antitank guided missile (ATGM) operators, and suppressing SAM guidance systems, artillery radars, and an aircraft's missile or bomb guidance equipment.[160]

Radio-electronic combat is an integral part of front, army, and division organization. At lower command echelons its tactical employment is very much tied up with artillery. The Soviets postulate that the radio-electronic combat measures must be implemented concurrently with the destruction of the most important targets. These targets can be command posts, reconnaissance and radio-electronic assets, forward air controllers, and radars.[161]

Reportedly Soviet division reconnaissance battalions have DF and intercept capabilities, but no jamming capability. Jammers will probably be placed at army level for specific operations, and these will be capable of successfully jamming any enemy radio link in corps areas. Most likely jammers will be used in conjunction with artillery in an attempt to disrupt specific parts of the enemy command system at critical moments in the battle. Therefore, close coordination will be established between Soviet reconnaissance troops, artillery and radio-electronic troops.[162]

Selective jamming will play a prominent role in any plan of attack by Soviet ground troops. However, jamming will not be directed by division headquarters, but by army headquarters.[163] The Soviets are well-aware of both their own vulnerability and the advantages to be obtained by possessing a well-coordinated radio-electronic combat offensive capability. Troops in operational-tactical and tactical echelons must be ready to conduct decisive combat actions independent from the main forces, under the conditions of active enemy ECM and possible interruption of communications with the higher staff.[164]

In practice, the Soviets show great skills in jamming and deception. They have begun to deploy a communications jamming variant of their armored personnel carriers. They are also becoming adept at using electronic means to conceal troop movements and deployments. Reportedly the Soviets have under development a new variant of the Su-24 Fencer aircraft intended to assist ground attack aircraft by electronically suppressing enemy SAMs and early warning interceptor radars.[165]

The Soviets were able to partially overcome their relatively unsophisticated radars through coupling a number of them, each operating on various frequencies, into an integrated early warning and fire system. Thus, although radars themselves are simple and can be jammed relatively easily, the frequency diversity of such a system makes them almost immune to hostile jamming.[166]

Chapter 5

CONCLUSIONS

Besides the development in technology, the single most important reason for the introduction of the recce-strike concept into Soviet combined arms combat is the steady evolution of Soviet military doctrine toward envisaging an increasingly longer conventional phase in a coalition war in Europe. Since the early 1970s the Soviets have decided to fight a conventional war, and if necessary a protracted one, in the European TVD. To preempt the use of tactical nuclear weapons by NATO, Soviet forces must move overland quickly and physically either seize or destroy NATO's nuclear delivery systems. All this would require the utmost coordination in maneuver, fire, and strike of diverse combat arms of ground troops, special troops, rear service units, and aviation.

The Soviets, have a great penchant for laying detailed foundations for every single aspect of their military activity. But there is always a gap between Soviet theory and actual capabilities. This is not less true with regard to the Soviet recce-fire and recce-strike concept. The theoretical concept exceeds Soviet capabilities to apply them in practice. However, as the capabilities improve, the concept is expected to be modified and recast to take into account the capabilities which are lacking at the moment.

The Soviets use numerous and diverse reconnaissance forces and assets at all command echelons. They have a well-developed system for obtaining tactical reconnaissance information. However, Soviet reconnaissance capabilities at the operational level seem less adequate. The Soviets currently do not extensively use RPVs as battlefield reconnaissance platforms. Nevertheless, it is expected that the Soviets will use these vehicles in larger number in the years ahead. The greatest problem for the Soviets is not quantity and quality of reconnaissance data, but the dissemination of this data to lower echelons so that they can be used by the respective tactical commanders.

The Soviet concept of fire support includes not only artillery fire support, but also fires delivered by operational-tactical and tactical missiles, aviation, and air defense troops. At the tactical level fire support also includes fire by tanks and antitank weapons. The trend is toward reducing the number of towed pieces by increasing the number of self-propelled pieces thereby greatly improving mobility, versatility, and survivability of artillery. In the not so distant future the Soviets will probably start to introduce bomblet warheads for their 203- and 152-mm gun/howitzers and possibly even 120-mm mortars. Terminally guided munition will probably be introduced

with the Soviet MRLs and SRBMs. The Soviets use their operational-tactical and tactical missiles fitted with conventional warheads for providing direct support to ground forces. There is also little doubt that the Soviets will use missiles fitted with chemical warheads in providing fire support.

The Soviet integrated fire support concept provides for continuous and integrated fire from diverse firing assets to achieve simultaneous and maximum destructive effects on the target. The main objective is to create an overwhelming superiority on the battlefield, which would prevent their adversaries from restoring their combat efficiency. To maximize the potential of this concept the Soviets have adopted an improved C3 system which allows for close coordination of fires of all types. Perhaps more important is that the new integrated fire support concept has resulted in a vast increase in both the quantity and density of fires. This, in turn, has led to a large increase in the quantity of guns, rocket launchers, and ammunition of all kinds. However, it remains to be seen whether the Soviets will be able in practice to carry out this new concept without undue effects on their entire logistical support system in the theater.

The Soviets give considerable attention both in theory and practice to all aspects of troop C3. At the same time they precisely have the greatest problems in that area. The Soviets devoted substantial resources to strategic C3 systems, and as a consequence the operational and tactical command echelons are relatively less mission-capable. One of the most serious shortcomings of Soviet troop C3 as a whole, in comparison to those used by the U.S./NATO, is less advanced computer technology. This will probably have negative effects on the Soviet capability to use effectively their recce-fire and recce-strike complexes.

One of the lingering weak spots in Soviet C3 systems is their dependence on mass-produced electronics. Further automation of recce-fire and recce-strike complexes will require additional increases in the capabilities of fire control computers, data-handling systems and displays. Presently the Soviets are believed to be about five years behind Western computer standards. The gap is even wider in the research and development of artificial intelligence. The latter is believed to be the most decisive component of C3I, especially in the area of automated information analysis and decision-making. However, it is still an open question whether these innovations will be possible for the Soviets even if the West relaxes its export of highly advanced computer technology to them.

Another serious weakness of Soviet automated control systems at all command levels is communications. Although considerable progress has been made in developing cable links between

stationary command posts and satellite data links, these networks are too few in number. The Soviets have not yet sufficiently mastered digital switching technology. They are reportedly unable to support extensive data links. Also, the number of computers to operate the battlefield networks is reportedly inadequate.

Nevertheless, the Soviets seem to have an advantage over NATO forces with respect to the survivability of their C3 system. Their lack of high technology is offset with quantity, mass, and simplicity. C3I centers are centralized, highly survivable, immune to interference, EMP-hardened to a great degree, and safe, owing to the wide use of cover, concealment, dispersal, and redundancy.

The Soviets are reportedly extremely capable of conducting extensive EW, especially jamming hostile electronic sensors. They are also skillful in using diverse concealment and deception techniques at all levels. It is believed, probably rightly so, that the sheer number and diversity of Soviet tactical C3 systems spread over the battlefield will make it difficult for any opponent to identify, target, and interdict successfully the vulnerable links, so as to negate Soviet tactical C2 during combat.

Perhaps potentially the most serious weakness of the entire Soviet C3 system, and especially of operational and tactical command echelons, is the pronounced penchant on the part of Soviet senior commanders not to delegate authority to their subordinates. Despite Soviet claims to the contrary, the widespread habit of waiting for orders and unwillingness to take risks cannot but have a deleterious effect on the accomplishment of assigned tasks. This will have a greater effect on the work of lower command echelons, especially in the work of commanders of tactical units.

The Soviet ability to deliver a variety of recce-strike and recce-fire tasks clearly lags behind their theoretical concepts; as the capability continues to grow, the concept will be adapted or altered to meet it. As the Soviet Ground Forces and aviation continue to field ever more advanced weapons and sensors, Soviet capability to carry out effective strikes in the depth of the adversary's operational and tactical disposition will increase. Soviet recce-strike and recce-fire complexes may lag in sophistication and effectiveness behind their Western counterparts, but their very number may well bring a quality of its own. Soviet emphasis on redundancy, use of diverse forces and assets, and massive concealment, cover, and deception measures will make it very difficult for their adversaries to destroy or neutralize recce-fire and recce-strike complexes on the battlefield.

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